DOCUMENT RESUME

ED 133 852   EA 009 106

AUTHOR   Lewy, A.
TITLE   The Development, Evaluation and Implementation of
                Curriculum. IIEP Seminar Paper: 4.
INSTITUTION   United Nations Educational, Scientific, and Cultural
                Organization, Paris (France). International Inst. for
                Educational Planning.
PUB DATE   75
NOTE   30p.; A contribution to the IIEP Seminar on "The
                Evaluation of the Qualitative Aspects of Education"
                (September 30-October 4, 1974); Some tables may be
                marginally legible due to small size of type and
                print quality of original; For related documents, see
                EA 009 106-111 and EA 009 113-116
AVAILABLE FROM IIEP Publications, 7-9 rue Eugene Delacroix, 75016
                Paris, France (3.00 francs)

EDRS PRICE   MF-$0.83 Plus Postage. HC Not Available from EDRS.
DESCRIPTORS   *Adoption (Ideas); *Curriculum Development;
                *Curriculum Evaluation; Developed Nations; Developing
                Nations; *Educational Objectives; Educational
                Planning; Elementary Secondary Education;
                *Instructional Materials; Models

ABSTRACT
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process of curriculum development, evaluation, and implementation. It
introduces the concepts of balance and relevance as criteria for
judging the adequacy of an educational programme and presents a model
for generating and selecting educational objectives. It then
describes two functions of curriculum evaluation: the modification of
curriculum material and the specification of conditions under which
the programme should be expected to function well. Finally, it
describes some problems related to the evaluation of programme
implementation. (Author)

IIEP seminar paper: ④

THE DEVELOPMENT, EVALUATION AND IMPLEMENTATION OF CURRICULUM

A. Lewy

A contribution to the IIEP Seminar
on "The evaluation of the qualitative
aspects of education"
30 September - 4 October 1974

INTERNATIONAL INSTITUTE
FOR EDUCATIONAL PLANNING
(established by Unesco)
7-9, rue Eugène-Delacroix, 75016 Paris

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This paper presents some principles related to the process of curriculum development, evaluation and implementation. It introduces the concepts of balance and relevance as criteria for judging the adequacy of an educational programme, and presents a model for generating and selecting educational objectives. It then describes two functions of curriculum evaluation: the modification of curriculum material and the specification of conditions under which the programme should be expected to function well. Finally it describes some problems related to the evaluation of programme implementation.

1.   BALANCE AND RELEVANCE

Two major criteria should be considered in the process of developing educational programmes: the balance between subjects and the relevance of the programme to the needs of students or society. The balance between subjects may imply changes in emphasis between subjects: for example, more emphasis on science subjects in relation to the traditional arts subjects or more emphasis on practical subjects in relation to academic subjects. The criterion to be used for balancing the curriculum should be its relevance to specific needs.

From this it follows that in order to establish a well-balanced programme one has first to identify the needs of the students and the society in question. The following statement from the goals of the educational system in a developing country illustrates this point: "... introduce into the system a more practical bias which is necessary to prepare secondary level children for the employment channels where they will be most needed". In this case, the relevance to needed 'employment channels' would serve as the criterion by which balance would be measured. Yet, apart from such an implication of the link between 'balance' and 'relevance', such a statement provides no further indications as to what this 'balance' means in terms of content, learning materials, and instructional procedures. That is, the statement provides no detailed specifications of how such global objectives are to be arrived at. It is essential that such objectives be specified operationally if effective evaluation of balance and relevance is to be undertaken. To arrive at such specifications, detailed steps which are the bases of curriculum development must be taken.

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2.   INTRODUCING A NEW CURRICULUM

Each country must organize its curriculum work along the lines it
regards as most suitable to its special conditions. Some countries will
have highly centralized curriculum centres, while others will decentralize
curriculum work. Some will place their curriculum work in the ministry of
education; others will create national centres located in some relation to
the ministry, the institutions of higher education, and the public-supported
schools. Still others will organize curriculum work as a series of special
contract projects to be supported by public and private funds.

However it is organized, each country will have to provide for three
functions:

(i) The determination of the specifications for the curriculum.
This function includes determining the content and objectives of the
curriculum. It requires a series of value decisions based on evidence
available in the country, special studies of social and educational needs
in the nation, expert opinion, and a body of theory and research on learning.
This function entails dealing with the most fundamental set of problems in
curriculum development, and each nation may learn from the experience of
other nations with these problems.

(ii) The development and evaluation of learning materials and
instructional procedures. This function requires highly skilled workers
who can create materials and procedures that will serve the objectives
specified for the curriculum and can evaluate its effectiveness. It
includes the tryout of the materials and procedures with students and
teachers working under appropriate conditions to identify limitations and
strengths. To assess the effectiveness of curriculum material, it is
necessary to employ appropriate evaluation instruments, sampling procedures,
research designs and statistical procedures. Again, each country can profit
from the experience of other countries and can contribute materials and
ideas to other countries. This stage in curriculum development requires a
technology which can be shared and improved in a systematic way from year
to year.

(iii) The monitoring of the implementation of new educational
programmes. A new educational programme is a package of products. It
usually contains a series of books and printed matters of different types,
audio-visual aids, laboratory equipment, etc. No matter how high the
quality of such a package - its educational value is determined by the

degree to which the programme is properly implemented in the system. Quite
frequently high quality programmes are stored away in school libraries and
ongoing classroom activities are considerably different from those suggested
by the authors of the new programme. Proper implementation of the programme
requires several activities. Firstly, there is the in-service and pre-service
training of teachers. Each nation must find ways of bringing its teachers
up to date on the new subject matter, methods, and ideas used in the new
curricula. Secondly, there is a need to secure adequate and timely supply
of all equipment and curriculum 'ingredients' which are needed for the
implementation of the programme. Thirdly, there is a need to introduce
appropriate changes in different branches of the educational mechanism
which may effect the implementation of the programme: the national examination
system, university entrance requirements, supervisory staff activities, and
'enrichment' education programmes should be adopted to the needs of the new
programme. Finally, care should be taken to update the new programme
whenever the need emerges.

3.   DEVELOPMENT OF THE SPECIFICATIONS

        This section is concerned with the determination of the specifications,
and with the development and the evaluation of curriculum material and
instructional procedures.

3.1   Determining what is to be learned

        If an educational programme is to be planned and if efforts for
continued improvement are to be made, it is necessary to have some conception
of the programme's goals. These goals become the criteria by which materials
are selected, content is outlined, instructional procedures are developed,
and tests and examinations prepared. All aspects of the educational programme
are means toward basic educational purposes. Hence, to study an educational
programme, we must first be cognizant of the educational objectives aimed at.

        But how are objectives determined? Since they are consciously willed
goals, are they simply matters of personal preference of individuals or groups?
Is there any way to attack systematically the problem of what objectives to
seek?

        It is true that, in the final analysis, objectives are matters of
choice, and they must therefore be considered value judgements of those
responsible for the schools. A philosophy of education should guide these

Judgements. In addition, certain kinds of information provide a more intelligent basis for applying the philosophy in making decisions about objectives. If this information is available to those making decisions, the probability of wise judgements about objectives will increase.

Certain kinds of investigations will provide information useful in deciding about objectives. Thus, the question arises of the sources of such information. Many considerations enter into the determination of what will be taught at any level in any subject area. Figure 1 indicates five categories of such considerations. Clearly, the critical forms of these considerations will vary from one society to another, but some will always be important. Each curriculum development group must decide on the specific forms of these major considerations. Let us examine five categories in turn.

Contemporary life outside school (economic, social, and political changes)

Subject-matter specialists

Psychology of learning

The needs of the student as learner

Philosophy of education

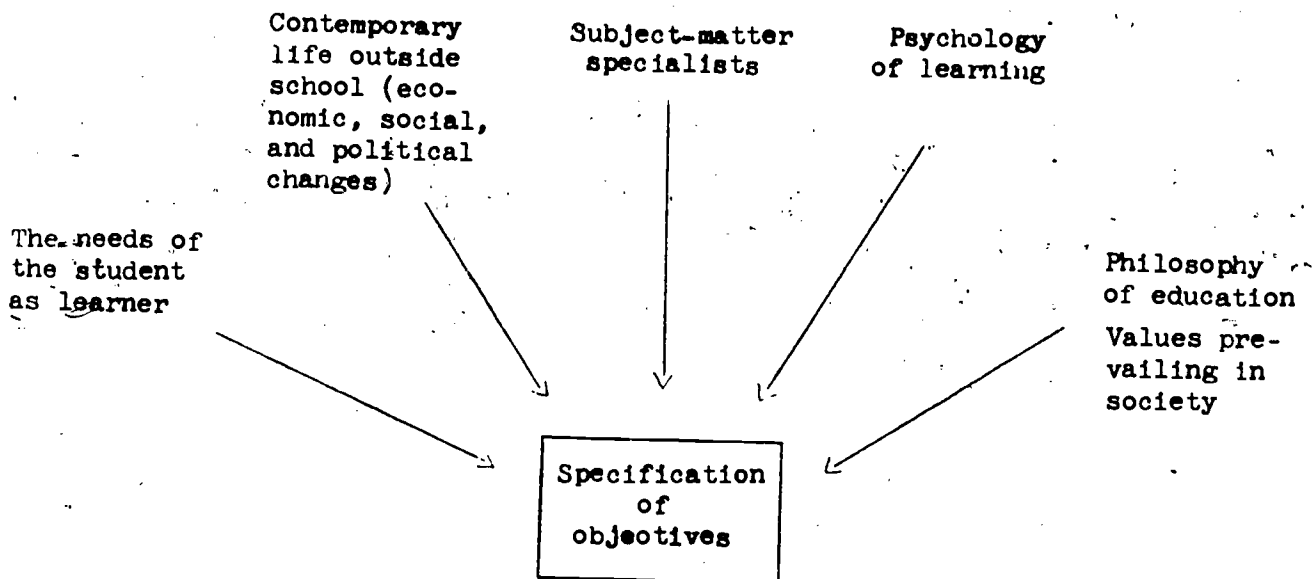Values prevailing in society

Specification of objectives

Figure 1. Categories of considerations in specifying objectives of school learning

3.2 The student as a learner

One categorisation of student needs with which school is supposed to deal could be made according to areas of life such as those presented in Table 1.

Areas of life	Types of skills		
	Intellectual	Emotional	Psychomotor
Health			
Occupation			
Social life			
Family life			
Recreation			

Table 1. Major areas of life for which the school has to prepare the student. In most of these areas, the student has to acquire some skills which pertain to the intellectual, emotional and psychomotor domains of behaviour though the balance of needed skills pertaining to these three domains is not the same in various areas of life.

In each area of life, studies can be conducted to discover the extent to which all students or sub-groups of students have their needs met. But studies of the learner will generate specific educational objectives only when the information about the present status of the learner is compared with some 'desirable standards', or some conception of acceptable norms. Then the difference between the present condition of the learner and the acceptable norm can be determined. This difference is the identified further need.

Another aspect of the student as learner consists of the relevance to himself or the contemporary world that he sees in what he is learning. Some examples will clarify the point. Why should a student in an ex-colony continue to learn the history (or geography) of the former colonial power instead of his own country's history or geography? If, in a particular society, drug taking becomes a problem, should a special curriculum be produced and if so, how should it be introduced into the schools?

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3.3   Contemporary life outside the school

If new attitudes about hygien· nave been developed through health laws, or if family planning is becoming accepted, how should these be introduced into the curriculum? At what levels? As new subjects, or in association with what traditional subjects?

The complex and changing nature of contemporary life requires that we identify the demands that modern life makes upon young people and equip young people to meet these demands and the opportunities they provide for development and expression.

What social and economic changes have occurred in recent years? What are the trends? How should these changes and trends influence what is taught in school? If the main source of employment is now tourism as opposed to sugar cane production, how should this change influence the curriculum? If major changes occur in the occupational structure of a country, how should this change affect the school programme? Needed knowledge and skills can be identified by examining on-going and predicted employment changes. The types of knowledge and skills required can then be introduced into the curriculum at various points.

3.4   Suggestions about objectives from subject-matter specialists

School textbooks are usually written by subject-matter specialists and, hence, the impact of these individuals has been great. Indeed, over 90 per cent of learning materials have, in most countries, been produced only by subject-matter specialists.

Subject-matter specialists have been criticized on the grounds that the objectives they propose are too technical, too specialized, or in other ways inappropriate for many students. Probably the inadequacy of many lists of objectives suggested by subject-matter specialists grows out of the fact that the   specialists have not been asked the right questions. Often they have thought they were answering the question: What should be the introductory curriculum for students who are later to carry on much more advanced work in the field? Hence, a report in history seems to present objectives for the beginning courses for persons who are training to become historians. Similarly, a report in mathematics outlines objectives for the beginning courses in the training of a mathematician. This is obviously not the form of the question that subject-matter specialists should be asked regarding a general education curriculum.

The question which the subject-matter specialists should more often be asked runs somewhat like this: What can your subject contribute to the education of young people who are not going to be specialists in your field? What can your subject contribute to the layman? What are the basic concepts which organize knowledge in your subject? What are the rules, principles and methods of inquiry in your subject for acquiring new knowledge? If subject-matter specialists can present answers to these questions, they can make an important contribution from their knowledge of the special field. Many of them have had an opportunity to see what the subject has done for them and for those with whom they work. Knowing the field as well as they do, they ought to be able to suggest possible contributions that their discipline and its content might make to others.

Subject-matter specialists often specify the requirements of a course in terms of content units to be taught. Thus the historian will indicate that the student should learn about Greek democracy or the French Revolution, or the specialist in physics will say the student should learn Kinetics, Dynamics, etc. But the list of content units does not provide a sufficient basis for formulating educational objectives. The specific skills or behaviour patterns which the student is expected to apply to each content unit should also be indicated. In the cognitive domain, outcome like knowledge, comprehension, etc., should be identified. In the affective domain, behaviour pattern like interest, commitment, etc., should be identified. Educational objectives are sufficiently clarified only when their definition refers to both the specific behaviour and the unique content area to which this behaviour should be applied. Three-dimensional grids where one dimension specifies content units and the other dimension represents behaviours are illustrated in Figures 2, 3 and 4. Each cell of these figures indicates a possible objective if the combination of the marginal elements of the table yields desired behaviours in relation to particular types of content.

3.5   The psychology of learning

Educational objectives are results to be achieved from learning. These desired results must be appropriate to the conditions inherent in the learning process.

Thus the psychology of learning constitutes a set of considerations useful in selecting among goals generated by considering the needs of the learner, the demands of contemporary life, and the topics included in various

BEHAVIOR

A 0 Knowledge and comprehension

B 0 Processes of scientific inquiry I Observing and measuring

C 0 Processes of scientific inquiry II Seeing a problem and seeking ways to solve it

CONTENT

1.0 Biological sciences
  1.1 Biology of the cell
    1.11 Cell Structure and Function
    1.12 Transport of Cellular Material
    1.13 Cell Metabolism
    1.14 Photosynthesis
    1.15 Cell Responses
    1.16 Concept of the Gene
  1.2 Biology of the organism
    1.21 Diversity of Life
    1.22 Metabolism in Organisms
    1.23 Regulation in Organisms
    1.24 Coordination and Behavior
    1.25 Reproduction and Development
    1.26 Human Biology
  1.3 Biology of populations
    1.31 Natural Environment
    1.32 Cycles in Nature
    1.33 Natural Groups and Their Segregation
    1.34 Population Genetics
    1.35 Evolution
2.0 Physical sciences
  2.1 Chemistry
    2.11 Chemical Materials
    2.12 Classification of Chemical Elements
    2.13 Chemical Change
    2.14 Chemical Laws
    2.15 Energy Relationships and Equilibrium in Chemical Systems
    2.16 Electrochemistry
    2.17 Atomic and Molecular Structure
    2.18 Introductory Organic Chemistry
    2.19 Chemistry of Life Processes
    2.110 Nuclear Chemistry
  2.2 Physics
    2.21 Kinematics
    2.22 Dynamics
    2.23 Energy and Its Conservation
    2.24 Mechanical Advantage
    2.25 Mechanics of Fluids
    2.26 Heat and Kinetic Theory
    2.27 Wave Phenomena
    2.28 Sound
    2.29 Light and Spectra
    2.210 Static and Current Electricity
    2.211 Magnetism and Electromagnetism
    2.212 Electronics
    2.213 Properties and Structure of Matter
    2.214 Theoretical Physics
  2.3 Earth and space sciences
    2.31 Solar System
    2.32 Stellar Systems
    2.33 Meteorology
    2.34 Physical Geology
    2.35 Historical Geology
    2.36 Geophysics and Geochemistry
    2.37 Oceanography
3.0 General
  3.1 Historical development
  3.2 Nature and structure of science
  3.3 Nature of scientific inquiry
  3.4 Biographies of scientists
  3.5 Measurement

* Some of the student behaviors are given here in abbreviated form. For complete wording, especially of behaviors A.10, A.11, B.4, B.5, and C.1 to C.3, see pages 303-306.

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Figure 2. **Table of specifications for science education**

BEHAVIOR

D.0 Processes of scientific inquiry III: Interpreting data and formulating generalizations						E.0 Processes of scientific inquiry IV: Building, testing, and revising a theoretical model						F.0 Application of scientific knowledge and methods			G.0 Manual skills		H.0 Attitudes and interests						I.0 Orientations				
D.1	D.2	D.3	D.4	D.5	D.6	E.1	E.2	E.3	E.4	E.5	E.6	F.1	F.2	F.3	G.1	G.2	H.1	H.2	H.3	H.4	H.5	H.6	I.1	I.2	I.3	I.4	I.5

Enter 0, 1 or 2 in each section of each box.

0 indicates that this topic, interpreted as described in the explanatory notes for the population in question, is not normally studied with this particular objective in mind at this sampling level.

1 indicates that this topic is included in the Science curriculum at this level with this particular objective in mind but is regarded as of slight to moderate importance.

2 indicates that this topic is included in the Science curriculum at this level with this particular objective in mind and is regarded as of major importance.

Subject areas	Objectives							
	1. Obtaining Scientific Information	2. Interpreting Scientific Information	3. Theorization Construction	4. Theorization Utilization	5. Comprehension	6. Application of Scientific Knowledge	7. Personal and Social Objectives	8. Philosophical Aspects
Earth Sciences								
1. Solar system								
2. Stellar systems								
3. Meteorology								
4. Earth's crust								
5. Physical Geography and Geology								
6. Soil Sciences								
Biological Sciences								
7. Cell structure and function								
8. Homeostasis.								
9. Cell metabolism								
10. Cell responses								
11. Concept of the-gene								
12. Diversity of life								
13. Metabolism in organisms								
14. Regulation in organisms								
15. Co-ordination and behavior								
16. Reproduction and development								
17. Human Biology								
18. Natural environment								
19. Cycles in nature								
20. Natural groups and their segregation								
21. Population genetics								
22. Evolution								
Physical Sciences:								
Chemistry								
23. Chemical change								
24. Electro-Chemistry								
25. Chemical laws								
26. Chemical processes								
27. Periodic system								
28. Energy relationships in chemical systems								
29. Rate of reaction								
30. Raw materials and chemical substances								
31. Chemical structure								
32. Polymerization and polymers								
33. Chemistry of life processes								
34. Nuclear Chemistry								
Physics								
35. Measurement								
36. Time and movement								
37. Forces								
38. Dynamics								
39. Energy and machines								
40. Mechanics of fluids								
41. Introductory heat								
42. Change of state								
43. Kinetic theory								
44. Light								
45. Vibration and sound								
46. Wave phenomena								
47. Spectra								
48. Static electricity								
49. Current electricity								
50. Magnetism, electro-magnetism and alternating currents								
51. Electronics								
52. Molecular and Atomic Physics								
53. Theoretical Physics								

Source: Comber, L.C. and J.P. Keeves, Education in nineteen countries, International Studies in Evaluation I, Appendix II, Stockholm, Almqvist & Wiksell, New York, Halsted Press, John Wiley & Sons Inc.

Figure 3. Subject area/behavioural objective grid

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Figure 4. Table of specifications for second language instruction

Source: Bloom, B.S., _Handbook of formative and summative evaluation of student learning_, McGraw Hill.

subject matters. The knowledge accumulated in the field of psychology of
learning may be in determining what goals can be attained through school
learning and what sequence of goals is most appropriate.

The psychology of learning can enable us to distinguish changes in
human beings that can be expected to result from a learning process from
those that cannot. Thus, young children can learn to channel their physical
reactions in more socially desirable directions, but they cannot learn to
inhibit physical reactions altogether.

Psychology can also contribute knowledge as to the time required to
bring about certain types of changes in young people. Thus, to change the
basic attitudes of children requires continuous emphasis extending over
several years. In general, basic attitudes are not markedly shift a
few months of instruction. Similar data have been obtained regarding he
time involved in changing ways of thinking and studying, basic habits and
practices, interests, and the like. Similarly knowledge about stages of
cognitive development can determine what objectives are most likely to be
attainable at various age levels.

3.6   Values prevailing in the society

Another set of considerations in selecting educational objectives
arises from the values prevailing in the society. Values must be considered
whenever one set of suggestions regarding objectives proves to be incompatible
with others or whenever all suggestions cannot be followed because of time
constraints. Then it becomes necessary to choose a few consistent objectives
and determine their priorities.

Such choices require value judgements based on the educational and social
philosophy to which the choice-makers are committed. An adequate formulation
of this philosophy provides the values education should seek to attain. These
values serve as criteria for every proposed objective, and the curriculum
builder should consider whether the objective is consistent with, in
opposition to, or unrelated to these values. Some proposals will be
accepted, and others rejected. Then priorities will be set among the
accepted objectives.

Some of the values on which decisions might be based would be those entailed in such issues as the following:

Transfer of traditional values	vs.	demands of contemporary life
General education of the citizen	vs.	training of specialists
Spiritual values	vs.	material values
Personal satisfaction	vs.	social success
Acceptance of given social order by the educated	vs.	'revolutionary mission' of the school

Social values must also be considered when changes occur in the proportion of the student population attending school. For instance, a school system may have been receiving about 10 per cent of an age group into its primary schools, and of these only 5 per cent may have proceeded to secondary school. Suppose a decision is made that 100 per cent of an age group will have six years of compulsory primary education, but still only 5 per cent will continue to secondary school. The primary schooling then becomes an end in itself. The new situation raises the questions of what objectives every child should master by the end of the six years.

3.7   <u>Bringing the considerations together</u>

It must be emphasized that these categories of considerations have not been arbitrarily chosen but probably have universal applicability. Each country must decide on the weights to be assigned to these considerations for its society or various sub-societies. In the last analysis, a set of value judgements will be made in bringing together the various sets of considerations to determine the specifications of objectives.

Let us return now to the concepts of balance and relevance. How does the foregoing approach ensure that these concepts will be served? Typically, as a necessary first step, a group of curriculum developers will decide on the subjects to be taught at any one grade level. But as each segment of the curriculum is systematically developed as described above, certain parts may require more time and other parts less time. By devoting appropriate time in the school programme to each educational objective, one can arrange an 'appropriate' balance. But balance is a time-bound concept. What may constitute balance at one time may not be appropriate five years later. Changing conditions may call for a change in the amount of attention paid in the school programme to, say, business education, wood or metal shopwork, or home economics. To keep abreast of social change and to ensure balance and relevance to changing conditions, periodic re-examinations of the total curriculum are necessary.

3.8   Variation between countries

Countries may vary in the extent to which they wish to undertake such an approach to curriculum development. Some may even question whether such an exercise is desirable at all. It would seem clear, however, that overall systematic attacks are superior to ad hoc curriculum development (e.g., curriculum development by groups of inspectors 'dreaming up' new curricula). As has already been mentioned, the considerations to be taken into account will vary in the weight they receive from situation to situation. But in each case, one should be able to list the considerations taken into account. A systematic approach is especially needed in cases where alternative curricula are to be developed. Only by identifying different groups of students, such as different school types or different ethnic groups, and systematically determining the curricula appropriate for each, can one justify similarities and differences in the programmes.

4.   THE WRITING AND EVALUATION OF INSTRUCTIONAL MATERIALS

Once the subjects or various domains of learning have been identified for each grade, the instructional materials must be produced. These usually take the form of textbooks but often also include various audio and visual (non-textbook) components. Indeed, television is being suggested as a main medium of education for some developing countries (but it should, perhaps, be added here that preliminary tryout and formative evaluation of television learning units have rarely been carried out).

The materials should be written to the curriculum specifications. Perhaps the most important requirement at the materials-writing stage is that there be agreement by panels of writers as to what each writer will produce. A special skill is required for writing materials - a skill which takes some developing. In general, experienced teachers form the best panels of writers. They know the type of language to use for particular groups of children, they learn from each other's writing, and they can use the results of the various preliminary tryout experiments. In particular, they know what activities or skills teachers are able or unable to perform as part of regular teaching and, therefore, they know best how to integrate teaching methods or situations with the instructional materials.

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4.1 Evaluation of the instructional materials

Systematic procedures are necessary but not sufficient for the production of a satisfactory curriculum. No matter how systematically the programme has been prepared, and how competent are the persons who have written the programme, the programme still needs systematic evaluation. No matter how experienced an engineering team is, or how diligently they may have worked in developing a new industrial product, it is unconceivable that an industrial company should proceed with the mass production of the product without a field tryout. Unfortunately, educational systems are not so careful and new programmes have frequently been disseminated without actual field tryout. Curriculum experts have emphasized the need to conduct evaluation before the final shape of the programme has been fully determined. Evaluation of this type, usually known as 'formative' evaluation, improves the quality of the educational product. Curriculum evaluation can produce suggestions bearing on (a) the modification of the curriculum materials, and (b) the conditions under which the programme should be expected to function well.

4.2 Modification of the curriculum material

Suggestions for modifying curriculum material can be obtained through utilizing expert judgement immediately after the first draft of the materials has been prepared and through collecting data of various types during the preliminary tryout of the material on a small and representative sample of students. Suggested modifications may consist of omitting some portion of the programme, providing more exercises for ensuring mastery of some skill, simplifying the presentation of some idea, providing more visual or manipulative aids to learning some new concept or skill, etc. Generally, it has proven useful to submit newly developed curriculum material (e.g. textbooks, film loops, television programmes or audio-visual aids) to experts who did not participate in its development and to invite them to judge the material. Experts of different kinds can contribute here. The subject-matter specialist can examine the validity of the material. The curriculum expert can determine whether it contains suitable learning activities. The most valuable judgements can be obtained from experienced and well-trained teachers who are familiar with the goals of the newly developed programme. Such teachers can judge which learning activities are likely to be smoothly carried out in the classroom, and which ones may cause

difficulties because of their complexity, vagueness, or lack of appeal
to the students. While such judging of curriculum material may seem to
be obviously necessary, it is far from universally employed. Such
systematic judgements usually result in suggestions for modifications that
improve the programme.

The preliminary tryout of new curriculum material on a small sample
of students, prior to its full-scale dissemination, also serves to detect
flaws in the programme and may also yield useful suggestions for its
modification. Such a tryout of each programme should be made even if it
extends the time needed for the preparation of a new educational programme.
During the tryout, data on the success of the programme can be obtained
from the following sources:

- Teacher conferences devoted to discussion of the merits and flaws
  of the programme.
- Teachers' responses to questionnaires prepared especially for this
  purpose.
- Observation of the teaching process by teams of evaluators.
- Analysis of students' products, such as their responses to
  questions on work sheets, their preparation of exhibits, etc.
- Students' responses to examination questions prepared especially
  for assessing the outcomes of specific learning activities.

Appropriate data of these types, and their skilful summarization are likely
to result in a series of suggestions for modification of the curriculum
material.

4.3 Specification of conditions under which the programme is expected to
     function well. Another type of result from the evaluation of new
study materials is the specification of the materials under which
the programme can be expected to function well. These conditions
may relate to the availability of some required equipment, teacher
competencies, or student characteristics.

An example of such student charactertistics can be obtained if we
assume that a grade 6 course in biology has been written. Assume also that
in a country the ability of students in grade 6 is highly correlated with
the urban-rural character of the students' community. Here then are two
variables considered to be important: student ability, and the rural or
urban location of school. If the biology course is meant to 'work' for all

students in grade 6 in the country (one can, of course, define the particular target population in any way one wants, but this must be done before the whole development process begins), then a small sample of classes, a sample based on judgement, must be chosen.

The actual variables used to select schools will vary from one society to another. The curriculum developers must decide which are critical. The teachers in these schools are trained by the curriculum developers to make proper use of the special curriculum in biology, the needed apparatus, the particular methods of presentation, etc. The instruction then takes place. Throughout the instruction a set of checks and evaluations are conducted. Since the curriculum is meant to be mastered by at least 80 per cent of all students, each teacher keeps a record of difficulties of parts of the course for all students or a representative sample of them. At the same time the school principal reports any disruption in the normal working of the school. But the most important criterion of how well the curriculum is 'working' is the achievement of the students. Since the specific objectives of each part of the new curriculum are known, it is possible to determine the extent to which the children have mastered a particular example. If one objective was to understand principles of experimentation (such as the principle that variables other than the independent variable should be controlled), an item such as the following might be used to test whether such understanding had occurred:

Tom wanted to learn which of three types of soil - clay, sand, or loam - would be best for growing beans. He found three flowerpots, put a different type of soil in each pot, and planted the same number of beans in each, as shown in the drawing. He placed them side by side on the window sill and gave each pot the same amount of water.

LOAM   CLAY   SAND

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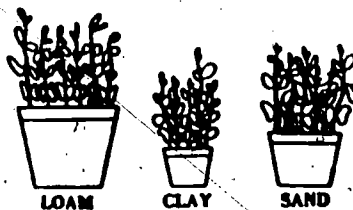
Why was Tom's experiment NOT a good one
for his purpose?

A. The plants in one pot got more
sunlight than the plants in the
other pots.

x B. The amount of soil in each pot
was not the same.

C. One pot should have been placed in
the dark.

D. Tom should have used different
amounts of water.

E. It would get too hot on the window
sill.

Let us hypothetically assume the following percentages of students
succeeding:

Total	Urban	Rural
75	88	62

These figures would indicate that:

(a) The learning materials are not working well enough for the target
population for this objective since we decided that at least 80 per cent
should master it.

(b) The materials do not fit the needs of rural children but they are
appropriate for urban children.

Thus it can be said that the programme, although appropriate for schools
in urban areas, requires revision to make it sufficiently effective with rural
children. Revision on the basis of masses of data of this kind would ensure
the kinds of balance and relevance discussed above.

5.   IMPLEMENTATION OF NEW EDUCATIONAL PROGRAMMES

This section is concerned with problems related to monitoring and to
evaluating the implementation of a new educational programme. As already
indicated, the real test of the utility of a new educational programme is
its adequate implementation. Many well conceived educational reforms have
failed because they were not properly implemented. In a follow-up study of
the 'progressive' school programmes in the USA in the 1930's, it was found
that many schools which subscribed to the new educational programme had
not changed at all and were continuing to operate as before. The adaptation
of the new programme in these schools thus becomes a mere declaration which
has not affected life in the classroom.

5.1   In-service and pre-service teacher training

Most new educational programmes cannot be implemented without
providing proper training for the teachers. Frequently there is a need
to teach the new material included in the curriculum. This is the case
for example with the new mathematics programmes. In other cases, new
teaching methods and new classroom working procedures should constitute
the main topic of teacher training. The development of teacher-training
programmes constitutes an integral part of any new curriculum package.
Provision should be made for teacher-training programmes to reach the
pre-service teacher-training institutes and co-operation with the teachers
of the teacher-training institutes is a prerequisite to success in this
field.

Issues related to teacher training and to the evaluation of
teacher-training procedures need more thorough discussion. Within the
framework of this lecture it is enough to call attention to the importance
of this problem.

5.2   Physical facilities

The implementation of new curricula is strongly dependent on the
timely provision of the necessary facilities. The development of adequate
logistics is indispensable for securing success with the programme. The
availability of laboratories, audio-visual equipment of different types,
a library and reference books are preconditions for the proper implementation
of new programmes. Programme evaluation should therefore be concerned with
testing the availability of these preconditions no less than with testing
students' achievement levels.

One issue subsumed under this heading is the actual time devoted
in the school timetable to teaching a certain programme examination of time
allocated to a given subject at the grade levels in question may provide
an indication as to whether sufficient attention is being given to the
programmes in school.

Nevertheless, inspection of the timetable does not in itself
constitute sufficient evidence that the programme is or is not being
properly implemented. Evaluators should make site-visits to schools selected,
to discover the extent to which the time allocations stipulated are actually
being observed, and whether the space and materials required for the proposed
curricular activities are being provided and used.

5.3   Co-ordination between different branches of the educational system

The activities of various branches of the educational administration
are related to the implementation of a new programme. Therefore co-ordination
among these activities is extremely important. We will deal here with three
branches of the educational system: the supervisional staff; the examination
board and 'enrichment' programme developments. One might add teacher-training
activities to this list, but this issue has been dealt with under a separate
heading.

(i)   The supervisional staff - Supervisors enjoy high prestige in
most educational systems. They occupy higher rank positions in the
educational hierarchy than school principals and teachers, and in many cases
teachers' promotions are dependent on supervisors' recommendations. Frequently
supervisors are authors of textbooks used in schools and they give directives
to teachers as to how to act in school.

The introduction of new educational programmes has in many cases
jeopardized the influence of supervisors on school activities and diminished
their prestige. This has happened because the new programme teams contacted
schools and teachers directly and the supervisors remained in ignorance of
the nature of the educational programmes. As a result the supervisors have
interfered with the implementation of the new programmes rather than promoted
it.

To secure the co-operation of the supervisional staff it is necessary
to involve them in the activities of programme development and of teacher
pre-service and in-service training. Without their co-operation programme
implementation becomes extremely difficult, if not impossible.

(ii)   The rôle of national examinations. Nationally devised external
examinations are set at one or more stages in the education system in many
countries, and it is often thought that the performance of students on
such examinations can be used to evaluate the curriculum they have been
following. Examinations may be set internally within separate schools or
they may be set externally by the state or some central authority. We are
only concerned here with the latter, where examinations may be used, for
example, to issue school leaving certificates, and to select those students
suitable for moving on to a higher stage of education.

Our concern is with external examinations that are intended to yield a measure of how much students have learned. The point we wish to emphasize is that the form and content of such examinations exert a profound influence upon what is taught in the schools in the years preceding the setting of the examination. This 'backwash' effect is not confined to developing countries; it also occurs in advanced countries. We should like to put on record the judgement that examinations can be good servants of an education system, but should never become its master. In other words, the curriculum should dictate the content and objectives of examinations, never the other way round. An end-of-course external examination is a powerful instrument which can be badly misused. It is unsound educational practice to allow an examination to determine what students need to learn and hence what they will be taught.

As we have earlier indicated, an ideal sequence should govern the development of a specific course or unit of instruction. The first step is the production of a set of detailed behavioural objectives. This is then used as a guide in devising instructional procedures which it is hoped will lead to the achievement of the objectives, and as a basis for designing the examination to assess the extent to which students have achieved the objectives. If this sequence is followed, the course or unit will be 'tailor made' to fit the desired objectives and the examination will be designed to measure exactly what the students have been taught.

The fact that the ideal is rarely achieved makes it imperative that the examination system employed in every country should be given close scrutiny, whether or not specific objectives relate to this area. It may indeed be necessary to seek a reform of the examination system in a given country, simply in order that other educational objectives may stand some chance of being achieved. For example, many projects have objectives concerned with introducing 'a practical bias' into the curriculum. Clearly what is precisely meant by this statement needs to be detailed in specific terms. But if, in the countries concerned, some subsequently administered examination introduces no element of 'practical' assessment, it is likely that this element will be given low priority in the teaching, resulting in failure to achieve the objective. Some measurement of manual ability, appropriate to the desired curriculum, should be included to ensure that the intended practical bias in the curriculum is put into effect.

The science and technology of examining have made much progress in the past forty or so years. Despite this, too few people in most developing countries have sufficient background, knowledge, training, and experience in the area of examinations to be aware of the problems and difficulties.

(iii) <u>Enrichment and supplementary educational programmes</u>. In many countries a variety of enrichment education programmes are fostered or developed by the authorities responsible for education. Most common programmes of this type are the radio and television programmes for schools or for students. But the publication of special book series, bulletins for students, children's theatre, summer camps, and so on, also belong to this category of programmes. It might be very useful to co-ordinate such supplementary or enrichment programmes with the needs emerging from the introduction of new programmes. Educational television programmes may be used for training teachers to use new curricula. The need for such co-ordination should be strongly emphasized. It has happened quite frequently that the curricula of a school system have been changed, but educational television programmes still continue to supplement the old programmes which are no longer being used.

(iv) <u>Systematic evaluation of curriculum through measures of student achievement</u>. We turn now to systematic curriculum evaluation through measures of student achievement. Here the results from the various types of testing that may have been undertaken are fed back to the curriculum development team for scrutiny and analysis. To illustrate such analysis, suppose that the curriculum planners are looking for a gain in performance on each topic represented by an item or group of items in the test. When the curricul. was tried out, such a gain was actually obtained, but it is not possible tell whether such a gain is going to occur after the curriculum has been implemented over the whole country. The returns from the evaluation procedures may show that in some cases an adequate gain has been achieved but in certain schools or in certain sub-groups of the population there seems to be no increase at all, and in some cases a fall in performance is observed. Such cases have to be examined in detail in order to determine what problems are hindering the efficient working of the curriculum.

One frequently recommended type of examination is one consisting of multiple-choice items. Such an examination will give an immediate idea of the proportion of students within each sub-group chosen according to critical

variables who have grasped (or failed to grasp) a particular subject area in
a particular behavioural category. However it is important that certain .
limitations of multiple-choice items be discussed in order to broaden the range
of the type of evaluations undertaken in curriculum. The question to be posed
at the moment is: are multiple-choice answers necessarily the only or surest
way of evaluating curriculum? There are other written tests, performance
tests and oral tests, that may give other indications of achievement in the
new curriculum. Performance tests are important in subject fields like science,
agriculture, arts and crafts, etc. By systematic observation it is possible to
determine to what degree students have acquired skills using their hands or
using tools. The information obtained from written tests and from performance
tests can be supplemented by observing actual behaviour of teachers and students
in the class. It is advisable that the observers should assess activities on the
basis of a check-list of desired events which are to occur in the class.
Observation enables the evaluators to determine the degree to which planned and
actual curriculum activities correspond.

It has sometimes been expressed by those concerned with the formation of
curricula in developing countries that positive attitudes towards manual work
should be a fundamental result of the instructional process. The introduction
of practical or relevant subjects into the curriculum is certainly a necessary
and important first step, and more appropriate measures should be developed
to assess the attitudes or change in additudes of the students. To obtain
information of this kind, attitude scales can be constructed and added to the
battery of tests.

'll this leads one to conclude that any evaluation of student achievement
should, wherever time and money permit, include written tests, performance tests
and observations of student behaviour. Such curriculum evaluation on the basis
of student achievement can be realized when a nationally organised body of
researchers is continually testing random samples of students of different ages
with test materials from a wide variety of curricular subjects. The plan is
that a complete curricular evaluation of a subject, such as, for example,
mathematics, would occur once every two or three years. Provided the basis
for choosing the samples has not been altered in the meantime, the change of
performance from one occasion to the next would give evaluators a measure of
the extent to which the level of achievement had risen. The chief drawback of
this approach is that it is extremely expensive in terms of resources. It needs
professional staff working over a long period to carry it through, and requires

facilities for the frequent administration of achievement tests to randomly drawn national samples. It appears probable that only a country with an already highly developed educational system could afford such a procedure. In a country in which only a minority of the children complete secondary education, it would be an-unjustifiable luxury.

For developing countries, a different model would appear to be more appropriate. This would make use of the methods developed by the IEA, but with the limited objective of measuring achievement in one national system. Random samples of students who have been working with a new curriculum would be drawn (as might be additional samples for comparative purposes). These students would then be included in the testing programme throughout the evaluation of the project if the evaluative mode is formative, or towards the end of the project if the mode is summative. Because the performance of groups of students rather than individual students is of interest, the curriculum evaluators could use item sampling techniques, whereby different students in one class would take several forms of the test. This procedure considerably increases the amount of test material it is possible to use. It thus provides a much more detailed picture of national achievement. The testing programme would be operated in conjunction with questionnaires to the students - collecting data on educational background and related characteristics - and questionnaires to the teacher - to gather information as to what has been taught, etc. The data so accumulated can then be analyzed by means of various statistical models so as to yield precise descriptions and explanations for varying levels of achievement.

5.4 Continuous updating of programmes

Curriculum material should be continually updated and supplemented. The task of the curriculum team does not finish with the publication of the curriculum package. During the time the curriculum package is in use in schools new problems may emerge and the curriculum team has to take care of coping with such problems. Many curriculum projects publish newsletters containing the reactions of teachers to various portions of the programme. Such newsletters also contain new series of exercises and a variety of learning experiences which may be added to the original stock contained in the programme. There is need to inform teachers about new developments in the subject matter which are relevant to topics included in the programme. Not only in the field of science may one experience rapid changes which cannot

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be overlooked in educational programmes, but also in the field of social
studies and humanities care should be taken to update programmes. A new
performance of a Shakespeare play may be of interest for the teacher of
literature just as new experiences in space research are important for the
science teacher.

Permanent care should be taken to improve the equipment used in
the implementation of programmes. Teacher training programmes should also
be modified on the basis of accumulated experience. Finally, new measurement
and evaluation ideas should be produced to help teachers to evaluate
achievement in their classes. Repeated use of the same tests year after year
may redu · their validity, since teachers and students become familiar with
the particular questions included in the test. In summary it can be said
that immediately after publishing a new programme, the curriculum team
should start collecting data which may be useful for producing revised
editions of the same programme.

6.   IMPLICATIONS FOR EDUCATIONAL SYSTEMS

As the present paper sets out to show, curriculum development,
evaluation and implementation are processes which require meticulous
planning, careful co-ordination between various branches of the educational
system and the continuous work of well-trained teams. If educational systems
are interested in responding to the emerging needs of changing societies,
they have to ensure that curriculum development is carried out as effectively
as possible. It is not enough to nominate ad hoc committees and impose
upon them the responsibility of producing new syllabi which contain lists
of topics to be taught in school. There is a need to establish curriculum
centres which will work on a permanent basis and which will deal systematically
with all the problems related to developing and to implementing adequate
educational programmes for the system. Curriculum centres should have
well-trained staff members and should also be able to secure the co-operation
of the best available experts in the country in various fields of specialization.
In order to determine the needs which the educational system has to meet it
is necessary to co-operate with experts in sociology, economy, public health,
philosophy, psychology, education, etc. Only the most competent experts in
the country are in a position to provide reliable information which can safely
be used in educational planning.

        To obtain balance and relevance in the field of educational
programmes, curriculum centres should use competent experts who are able
to translate general educational goals into behavioural objectives, and
to devise appropriate learning experiences which will facilitate the
acquisition of needed skills and desired behaviours. Furthermore,
curriculum centres should be responsible for the experimental tryout of
new study material, for developir and running teacher training programmes
which will enable the proper implementation of new programmes; for making
proper adjustments in the working scheme of supervisors; for adjusting the
national examination system to the needs of new programmes; and for
monitoring the implementation of new programmes. International co-operation
in this field may be beneficial. Countries and curriculum centres may
profit from the exchange of experiences. The establishment of a communi-
cation network between curriculum centres, exchange visits and international
seminars are only a few examples of channels which may contribute to the
success of curriculum development activities in both developed and
developing countries.

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